

WHAT IS CLAIMED IS:

1. A fuel cell gas separator integrated into a fuel cell and forming a gas flow path, comprising:

a separator base material formed from a metal and having a surface;

a noble metal coating layer formed from a noble metal and formed at least on the surface of the separator base material in a region of the gas separator associated with an electrical contact resistance between the gas separator and an adjacent member of the fuel cell when the gas separator is brought into contact with the adjacent member when the gas separator is integrated into the fuel cell; and

a carbon coating layer formed on the noble metal coating layer and containing a carbon material.

2. The gas separator according to claim 1, wherein the noble metal coating layer has a thickness in a range from 0.01  $\mu\text{m}$  to 10  $\mu\text{m}$ .

3. The gas separator according to claim 1, wherein the noble metal forming the noble metal coating layer is silver.

4. The gas separator according to claim 1, wherein

the separator base material is formed from a base metal,

the carbon coating layer is formed on a region forming the gas flow path within the fuel cell, in addition to the region where the noble metal coating layer is formed on the surface of the separator base material, and

the base metal forming the separator base material forms a passive state film under a condition that the carbon coating layer is formed thereon.

5. The gas separator according to claim 1, wherein the noble metal coating layer is further formed on a region forming the gas flow path, in addition to the region of the gas separator that contacts the adjacent member.

6. The gas separator according to claim 1, further comprising an underlying coating layer formed from a base metal and formed between the noble metal coating layer and the separator base material on the region of the gas separator that contacts the adjacent member.

7. The gas separator according to claim 6, wherein the base metal forming the underlying coating layer is nobler than the metal forming the separator base material.

8. The gas separator according to claim 7, wherein

the carbon coating layer and the underlying coating layer are formed on a region forming the gas flow path within the fuel cell, in addition to the region of the gas separator that contacts the adjacent member, and

the underlying coating layer is formed from a base metal that forms a passive state film under a condition that the carbon coating layer is formed thereon.

9. The gas separator according to claim 6, wherein the underlying

coating layer has a thickness in a range from 0.01  $\mu\text{m}$  to 10  $\mu\text{m}$ .

10. The gas separator according to claim 1, wherein the carbon coating layer includes an acid-resistant resin or rubber as a binder.

11. The gas separator according to claim 1, wherein the noble metal forming the noble metal coating layer is gold.

12. A fuel cell gas separator integrated into a fuel cell and forming a gas flow path, comprising:

a separator base material formed from a metal and having a surface forming the gas flow path;

a base metal coating layer formed from a base metal and formed at least on the surface of the separator base material in a region of the gas separator associated with an electrical contact resistance between the gas separator and an adjacent member of the fuel cell when the gas separator is brought into contact with the adjacent member of the fuel cell when the gas separator is integrated into the fuel cell; and

a carbon coating layer formed on the base metal coating layer and containing a carbon material, wherein

the base metal coating layer includes a plurality of electron-conductive particles at least on a surface that is in contact with the carbon coating layer, the electron-conductive particles being stable under a condition that the carbon coating layer is formed on said surface of the base metal coating layer.

13. The gas separator according to claim 12, wherein the electron-

conductive particles are particles containing carbon.

14. The gas separator according to claim 12, wherein the base metal forming the base metal coating layer is a metal whose surface may be oxidized to form a passive state layer under the condition that the carbon coating layer is formed on the surface of the base metal coating layer.

15. A method for manufacturing a fuel cell gas separator integrated into a fuel cell and forming a gas flow path, comprising the steps of:

forming a separator base material having a predetermined shape from a metal;

forming a noble metal coating layer from a noble metal at least on the separator base material in a region of the gas separator associated with an electrical contact resistance between the gas separator and an adjacent member of the fuel cell when the gas separator is brought into contact with the adjacent member when the gas separator is integrated into the fuel; and

forming a carbon coating layer from a carbon material on a surface of the noble metal coating layer.

16. The manufacturing method according to claim 15, wherein the step of forming a noble metal coating layer includes the steps of:

prior to forming the noble metal coating layer, forming an underlying coating layer from a base metal at least on the region associated with the electrical contact resistance on the separator base material; and

forming the noble metal coating layer on the underlying coating

layer.

17. The manufacturing method according to claim 15, wherein the noble metal forming the noble metal coating layer is silver.

18. A method for manufacturing a fuel cell gas separator integrated into a fuel cell and forming a gas flow path, comprising the steps of:

forming a separator base material having a predetermined shape from a metal;

forming a base metal coating layer from a base metal at least on the surface of the separator base material in a region of the gas separator associated with an electrical contact resistance between the gas separator and an adjacent member of the fuel cell when the gas separator is brought into contact with the adjacent member of the fuel cell when the gas separator is integrated into the fuel cell; and

forming a carbon coating layer from a carbon material on a surface of the base metal coating layer, wherein

the base metal coating layer includes a plurality of electron-conductive particles at least on a surface that is in contact with the carbon coating layer, the electron-conductive particles being stable under a condition that the carbon coating layer is formed on the surface of the base metal coating layer.

19. The manufacturing method according to claim 18, wherein the electron-conductive particles are particles containing carbon.

20. The manufacturing method according to claim 18, wherein the base

metal forming the base metal coating layer is a metal whose surface is oxidized to form a passive state layer under the condition that the carbon coating layer is formed on the surface of the base metal coating layer.

21. A method for manufacturing a fuel cell gas separator integrated into a fuel cell and forming a gas flow path, comprising the steps of:

forming a noble metal coating layer from a noble metal at least on a region of a surface of a metal member serving as a base material of the gas separator;

forming a carbon coating layer from a carbon material on a surface of the noble metal coating layer; and

forming the metal member having both the noble metal coating layer and the carbon coating layer being formed on the surface of the metal member into a predetermined shape.

22. The manufacturing method according to claim 21, wherein the step of forming a noble metal coating layer includes the steps of:

prior to forming the noble metal coating layer, forming an underlying coating layer from a base metal at least on the region where the noble metal coating layer is formed on the metal member; and

forming the noble metal coating layer on a surface of the underlying coating layer.

23. The manufacturing method according to claim 21, wherein the noble metal forming the noble metal coating layer is silver.

24. The manufacturing method according to claim 21, wherein  
the metal member is a sheet-like member capable of producing  
a plurality of fuel cell gas separators, and  
the step of forming the metal member into a predetermined shape  
includes the steps of:  
providing the metal member with a predetermined concave-convex  
shape; and then  
dividing the metal member into a plurality of single elements  
of the gas separator base material.

25. The manufacturing method according to claim 21, wherein the noble  
metal forming the noble metal coating layer is gold.

26. A method for manufacturing a fuel cell gas separator integrated  
into a fuel cell and forming a gas flow path, comprising the steps of:  
forming a base metal coating layer from a base metal at least  
on a region of a surface of a metal member serving as a base material  
of the gas separator;

forming a carbon coating layer from a carbon material on the  
base metal coating layer; and

forming the metal member having both the base metal coating  
layer and the carbon coating layer being formed on the surface of  
the metal member into a predetermined shape, wherein

the base metal coating layer includes a plurality of  
electron-conductive particles at least at a surface that is in  
contact with the carbon coating layer, the electron-conductive  
particles being stable under a condition that the carbon coating  
layer is formed on the base metal coating layer.

27. The manufacturing method according to claim 26, wherein the electron-conductive particles are particles containing carbon.

28. The manufacturing method according to claim 26, wherein the base metal forming the base metal coating layer is a metal whose surface is oxidized to form a passive state layer under the condition that the carbon coating layer is formed on the base metal coating layer.

29. The manufacturing method according to claim 26, wherein  
the metal member is a sheet-like member capable of producing  
a plurality of gas separators, and  
the step of forming the metal member into a predetermined shape  
includes the steps of:  
providing the metal member with a predetermined concave-convex  
shape; and then  
dividing the metal member into a plurality of single elements  
of the gas separator base material.

30. A fuel cell using the gas separator according to claim 1.

31. A fuel cell using the gas separator according to claim 12.